WESTON's Project Manager of the problem and anticipated change, and implementing the change.

If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then WESTON's Project Manager will issue a nonconformance report. WESTON's Project Manager will be responsible for informing WESTON's Project Director, Techalloy's Project Director, and the U.S. EPA's RCRA Project Coordinator. WESTON's Project Manager will be responsible for making sure that corrective action for nonconformance are performed as follows:

- Evaluating all reported nonconformance.
- Controlling additional work on nonconforming items.
- Determining disposition or action to be taken.
- Maintaining a log of nonconformance.
- Reviewing nonconformance reports and corrective actions taken.
- Ensuring nonconformance reports are included in the final site documentation in project files.

If appropriate, the Project Manager will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

All changes will be evaluated based on the potential to impact the quality of data. WESTON's Project Manager has ultimate responsibility for all site activities and must approve all changes verbally or in writing prior to field implementation by the Field Team Leader. WESTON's Project Director, Techalloy's Project Director, and the U.S. EPA's RCRA Project Coordinator will be notified when changes are implemented in the field.

All problems and corrective actions will be documented in the field logbook by the Field Team Leader. No field team member will start corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, the Field Team Leader may stop work following instructions from WESTON's Project Manager or the U.S. EPA's RCRA Project Coordinator.

14.2 LABORATORY CORRECTIVE ACTIONS

The laboratory-action protocols discussed in this section pertain to WESTON-Gulf Coast Laboratories, Inc. If any additional or alternate laboratories are assigned to perform analysis under this QAPP, WESTON will address changes to the corrective action procedure in an addendum to the QAPP. WESTON will submit the addendum to the U.S. EPA for review.

Laboratory corrective action may be immediate or long-term. Immediate corrective action to correct or repair nonconforming equipment and systems is generally done as the result of QC procedures. Any time an out-of-control situation occurs in the laboratory, a corrective action report (CAR) is completed by the analyst and submitted to the Unit Leader or Section Manager. The CARs document the out-of-control situation as well a the return-to control status. Original CARs are filed with the laboratory raw data or spreadsheets for future reference.

Long-term corrective action is generally undertaken due to QA issues that are most often identified during audits. Long-term corrective actions involve a deeper investigation into the root cause of the nonconformance, and may take much longer to identify and resolve. Staff training, method revision, replacement of equipment, LIMS reprogramming, etc., may be indicated long-term corrective actions.

All corrective actions, whether immediate or long-term, will employ the following steps to ensure a closed-loop corrective action system.

- Define the problem.
- Assign responsibility for investigating the problem.
- Determine a corrective action to eliminate the problem.
- Assign and accept responsibility for implementing the corrective action.
- Establish effectiveness of the corrective action and implement the correction.
- Verify that the corrective action has eliminated the problem.

The initial responsibility to monitor the quality of a function or analytical system lies with the individual performing the task or procedure. Quality indicators are evaluated against laboratory-established or client-specified QA/QC requirements. If the assessment reveals that any of the QC acceptance criteria are not met, the analyst must immediately assess the analytical system to correct the problem. Figure 14-1 presents WESTON-Gulf Coast Laboratories, Inc. Corrective Action Documentation Form. When an acceptable resolution cannot be met and/or data quality is negatively impacted, the analyst will notify the appropriate supervisor and initiate a Sample Discrepancy Report Form (Figure 14-2).

When the appropriate corrective action measures have been defined and the analytical system is determined to be "in control" or the measures required to put the system "in control" have been identified and scheduled, the problem and resolution or planned action is documented in the appropriate notebook. If a Sample Discrepancy Report (SDR) was required, the report will be routed for proper authorizations and signatures. Depending on the nature of the SDR, the project manager or section manager will sign the SDR for notification that the discrepancy has been documented and corrected.

Data generated concurrently with an out-of-control system will be evaluated for usability in light of the nature of the deficiency. If the deficiency does not impair the usability of the results, data will be reported and the deficiency noted in the case narrative. Where sample results are impaired, the Laboratory Project Manager is notified by a written Sample Discrepancy Report and appropriate corrective action (e.g., re-analysis) is taken and documented.

WESTON CORRECTIVE ACTION DOCUMENTATION

AUDIT REPORT #

INSTRUCTIONS: 1) ORIGINATOR completes PERSON RESPONSIBLE FOR RESPONSE and DESCRIPTION OF PROBLEM blocks.
2) Originator forward form to PERSON RESPONSIBLE FOR RESPONSE.
3) Develop/plan a SEQUENCE OF CORRECTIVE ACTION and obtain INITIAL CA APPROVAL sign-off from supervisor.
4) Forward original form to QA for sign-off and FOLLOW-UP ACTION. This allows all pertinent action to be documented on the original form. On completion of the corrective action, the form is signed off by QA, distributed, and the original archived with the QA records.

DATE/ORIGINATOR

PAGE ___ OF ___

PERSON RESPONSIBLE FOR RESPONSE (corrective action plan and implementation of corrective action plan):

DISTRIBUTION:
___ LABORATORY MANAGER
___ INORGANIC MANAGER
___ GC/MS MANAGER
___ GC/EXTR MANAGER
___ QA MANAGER
___ QA REPORT FILE
___

DESCRIPTION OF PROBLEM and when identified:

CAUSE OF PROBLEM if known or suspected:

SEQUENCE OF CORRECTIVE ACTION (CA) planned (signature/date): ____________________

INITIAL CA APPROVAL: Supervisor signature/date:
QA signature/date:

DESCRIPTION OF QA FOLLOW-UP ACTION (include signature/date):

FINAL CA APPROVED (QA signature/date):

RFW 21-21-006/C-03/91

FIGURE 14-1

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Three Hawthorn Parkway
Vernon Hills, Illinois
60061

WESTON GULF COAST LABORATORIES
CORRECTIVE ACTION DOCUMENTATION FORM
TECHALLOY COMPANY, INC.
Union, Illinois

WESTON SAMPLE DISCREPANCY REPORT (SDR)

SDR IN-PROGRESS ROUTING: (see other side)

Initiator ____________________
Date ____________________
Client ____________________
RFW Lot # ____________________
Samples ____________________

Parameter: ____________
Matrix: ____________
Prep Batch: ____________
Urgency:
___ Immediate ___ Other

Category for Discrepancy:
___ Log-In
___ LIMS
___ Analysis/Sample
___ Project Revision
___ Other:

A. Reason for SDR:

A1a.
Requires Verification By (circle):
Log-in or Prep Group

___ Missing Sample/Extract
___ Wrong Sample Pulled
___ Improper Bottle Type
___ Container Broken
___ Preservation Wrong
___ Received Past Hold
___ Insufficient Sample
___ Label ID's Illegible

A2.
Verified By (circle):
Log-in or Prep Group

(signature)	(date)
____________	________
____________	________
____________	________
____________	________
____________	________
____________	________
____________	________
____________	________

A1b.

___ Re-Log: Tech Profile Error..Client Changed Request..
Sampler Error on C-O-C..Transcription Error..
Wrong Test Code, Re-Log As ________
___ Re-Leach: Metals/Inorg/VOA/BNA/Pest/Herb/____
___ Re-Digest: AA/ICP/HG/______
___ Re-Extract: BNA/PEST/______
___ QC Out: SURR/MS...High/Low/<10%/Missing/2X
___ QC Out: B/BS/BSD/LCS/LCS-D...High/Low
___ Hold Time Exceeded: Prep/Analysis/Report
___ Not Amenable to Analysis
___ Other (describe)

B. PM Instructions For Disposition (signature/date): ____________________

___ Cancel ___ Add ___ Subout Analysis
___ Place On Hold ___ Take Off Hold
___ Change W.O. # to: ____________
___ MS/MSD on Sample ____, if enough sample: ORG/INORG
___ MS/DUP on Sample ____, if enough sample: ORG/INORG
___ Change Client name to: ____________________
___ Wrong Test Code, Re-Log As ________
___ Include in Narrative

___ Other, explain:

C. FINAL ACTION:

a clear description of what was done for resolution, when it was done, and by whom it was done

Action Taken:
___ Revision To Chain-of-Custody Completed
___ LIMS Corrections Completed
___ Other, explain

Action By (name/date): ____________________
Forward to Pat Feldman, QA for distribution ——

D. Distribution of Completed SDR

X Initiator: ____________
X Lab Manager: J.R. Tuschall
X QA (original): D.S. Therry
___ Data Reporting: ____________
___ ____________

Distributed By:
(signature/date)

RFW 21-21-006/E-10/90 (SDR Revision 5.0)

FIGURE 14-2

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Three Hawthorn Parkway
Vernon Hills, Illinois
60061

WESTON GULF COAST LABORATORIES
SAMPLE DISCREPANCY REPORT FORM
TECHALLOY COMPANY, INC.
Union, Illinois

SDR CIRCULATION

Forward To:			Received:	
(✓)	Name	Date	Initials	Date
LAST: Over for Final Copy and Distribution				

SUMMARY INSTRUCTIONS:

1. Initiator complete the top header section, and Section "A" Reason for SDR:

   If "A1a": route the YELLOW copy to "A2" Log-In/Sample Prep (circle one) for Verification.

   If "A1b": check/circle/fill in the applicable spaces,
   route the YELLOW copy to "B" PM Instructions for Disposition,
   or complete "C" Final Action.

2. After "A2" Verification: route the YELLOW copy to "B" PM Instructions for Disposition (if necessary), or complete "C" Final Action

3. After "B" PM Action: route YELLOW copy to the person responsible for taking the Final Action "C" to resolve the SDR.

4. Final Action: Describe the action taken for final resolution of the SDR in the lower left hand box "C" of the YELLOW copy.

5. Forward the completed YELLOW copy of the SDR to QA for distribution "D".

FIGURE 14–2 (cont.)

The Laboratory QA Section has the authority to stop the analysis and to hold all analyses of samples affected by an out-of-control situation. The method cannot be restarted without the above documentation leading to the QA Section's approval to restart the method. For cases where suspension of the method was imposed by the QA Section, sign-off is required prior to reinstatement of the affected method.

The Section Manager, with the respective Unit Leaders and Supervisors, is responsible for correcting out-of-control situations, placing highest priority on this endeavor.

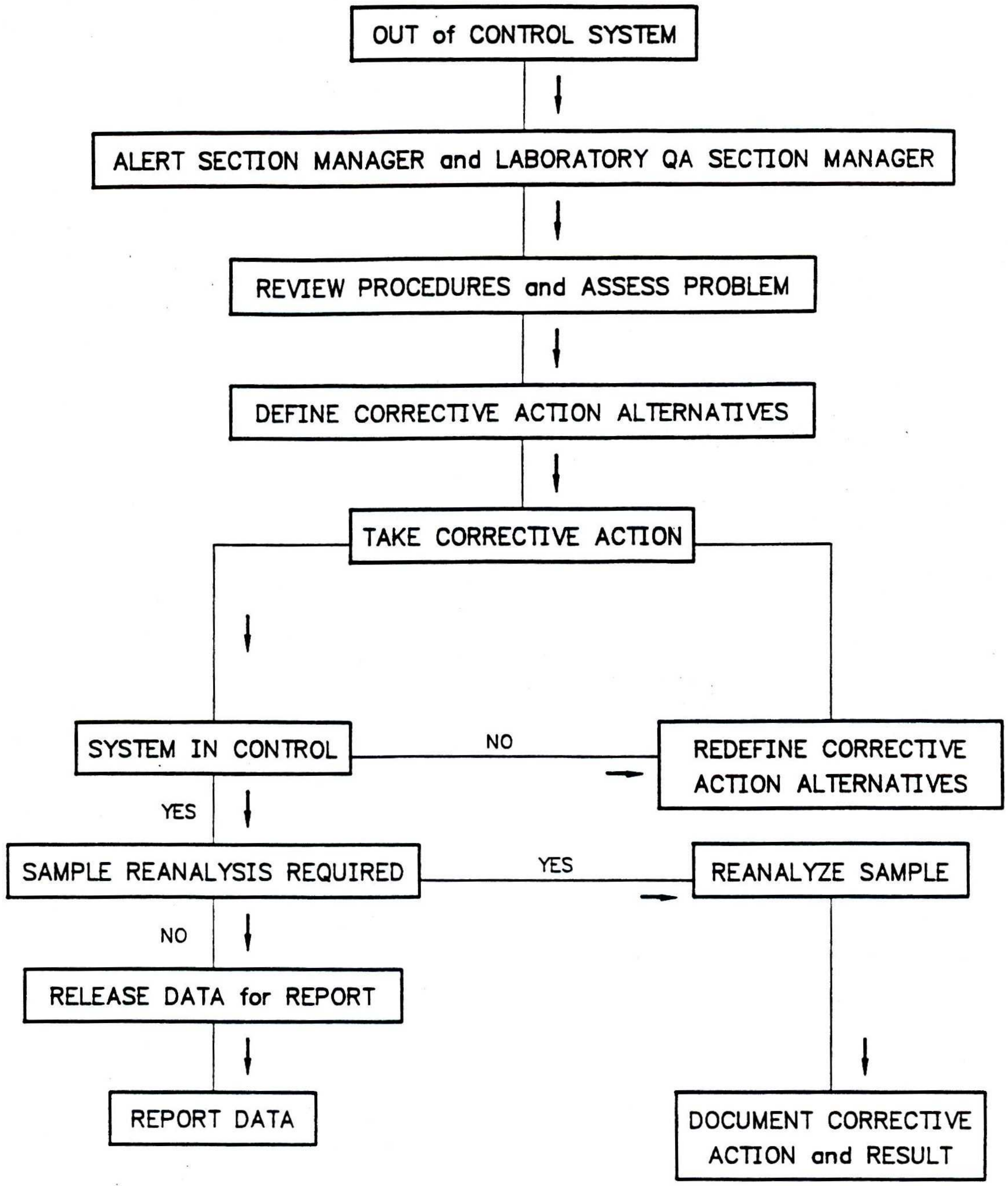
Any out-of-control situations that are not acceptably addressed at the laboratory level may be reported to Corporate Quality Assurance Management by the Laboratory Quality Assurance Manager, indicating the nature of the out-of-control situation and problems encountered in solving the situation. This provides laboratory QA personnel with nonlaboratory management support, if needed, to ensure QA policies and procedures are enforced.

The critical path assessing laboratory corrective action is presented in Figure 14-3.

<u>Responses to External On-Site/Performance Samples</u>

When the results from an external on-site audit or performance evaluation study are received by the laboratory, a summary of the results is distributed to appropriate laboratory personnel.

If deficiencies exist, the person responsible for the response will issue a memo addressing the findings and resultant steps to correct the deficiency. Upon receipt of all corrective action responses, the Laboratory QA Section will forward the information to WESTON's



CAD93\600\68992

FIGURE 14-3

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Three Hawthorn Parkway
Vernon Hills, Illinois
60061

CRITICAL PATH for
LABORATORY CORRECTIVE ACTION

TECHALLOY COMPANY, INC.
Union, Illinois

Project Manager. WESTON's Project Manager will inform Techalloy's Project Director and the U.S. EPA's RCRA Project Coordinator.

SECTION 15

QUALITY ASSURANCE REPORTS TO MANAGEMENT

WESTON's Project Manager and Quality Assurance Manager will audit the use of this QAPP. The preparation of a QA Report is not anticipated except as necessitated by problems arising during the project. If these problems should require the preparation of a QA Report, this task will be the responsibility of WESTON's Project Manager. The report may also include an assessment of field activities, data quality and the results of system and/or performance audits, as applicable. Any QA Report prepared by WESTON's Project Manager will be submitted to WESTON's Project Director, Techalloy's Project Director, and U.S. EPA's RCRA Project Coordinator. The QA report may be incorporated into a monthly progress report. The QA report will address any data validation or assessment that has taken place since the previous report. The final project report will include QA information, regardless of whether or not QA problems are observed.

APPENDIX A

FIELD SAMPLING PLAN (FSP)

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LIST OF FIGURES

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SECTION 1
INTRODUCTION

This appendix presents the Field Sampling Plan (FSP) for the RCRA Facility Investigation (RFI) to be completed at the Techalloy facility in Union, Illinois. The FSP defines the specific procedures to be followed during all of the field investigation activities. Specifically, the FSP addresses:

- Sampling network design and rationale.
- Field investigation protocols.
- Number, location, and type of samples.
- Sample containers and preservation.
- Sample packaging and shipment.
- Decontamination procedures.
- Sample nomenclature.
- Quality Assurance/Quality Control (QA/QC) for field sampling.
- Sample documentation.
- Chain-of-custody procedures.

The FSP was designed to complete the objectives of the RFI as stated in Subsection 2.3 of the Quality Assurance Project Plan (QAPP). The principal task of the RFI field program is to collect data and sample environmental media. The data and the analytical sample data will be analyzed to determine the extent that past operations at Techalloy have impacted the environmental media. A second task of the field program is to provide an adequate database to conduct a Corrective Measures Study (CMS). During development of the sampling strategy, the data described in Section 2 of the QAPP was considered carefully. The data collection and field sampling program was designed to expand on the previously existing data and to address the data gaps identified in Section 2 of the QAPP.

The field sampling program has been designed using a two-phase approach. Phase I consists of the anticipated sampling activities required to fully characterize the areas in question. Phase II investigative activities will be contingent on the Phase I results.

SECTION 2

SAMPLE NETWORK DESIGN AND RATIONALE

2.1 OBJECTIVES OF THE SAMPLING PROGRAM

The sampling program to be undertaken as part of the Techalloy facility RFI/CMS involves the collection and analysis of data in order to accomplish the following objectives:

- Assess potential releases from the solid waste management units (SWMUs).
- Determine the vertical and horizontal extent and magnitude of constituents in the source area(s).
- Determine the vertical and lateral extent and magnitude of constituent migration in groundwater.
- Screen and evaluate appropriate remedial alternatives.

Table 2-1 presents the objectives of each task to be performed and the rationale. Table 2-2 presents a summary of the sampling effort under the RFI, including type of sample collected, parameters analyzed, and number of samples collected.

The following subsections present the sampling network design and rationale that has been developed to satisfy the RFI objectives.

2.2 PHASE I INVESTIGATION ACTIVITIES

The Phase I investigation activities will include subsurface soil sampling and groundwater sampling in five specific areas. These areas are in and around the five Solid Waste Management Units (SWMUs) identified in the U.S. EPA Consent Order issued to Techalloy

Table 2-1

Objectives of Facility Investigation
Techalloy Site
Union, Illinois

Objectives	Task	Activity	Purpose
Phase I			
Source Characterization	Sample soil.	Logging of soils Sample collection/analysis	Define media. Determine existing concentrations and extent of constituents.
Pathway Characterization	Sample groundwater.	Sample collection/analysis	Determine vertical extent of constituents at individual SWMUs.
	Confirm groundwater flow conditions on and off site.	Monitoring well water level measurements	Confirm groundwater migration flow path on and off site.
Extent of Volatile Constituent Migration	Collect groundwater samples downgradient of suspect source area, on and off site.	Groundwater samples from on- and off-site monitoring wells	Confirm existing level and extent of constituents in groundwater. Aid in potential placement of additional monitoring wells.
Phase II			
Source Characterization	Sample soil.	Logging of soils Sample collection/analysis	If extent not fully determined under Phase I, Phase II will define media and determine existing concentrations and extent of constituents.
Pathway Characterization	Completed under Phase I.		
Extent of Volatile Constituent Migration	Completed under Phase I.		

Table 2-2

Summary of Sampling Effort
Techalloy Company, Inc.
Union, Illinois

Sample Matrix	Field Parameters	Laboratory Parameters (as defined at QAPP Table 2-12.1 to 2-12.3)	Investigative			Field Duplicate			Field Blank			Matrix Spike/ Matrix Spike Duplicate[1]			Matrix Total[2]
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Phase I															
SWMU Soil Borings															
Wire Slag Disposal Area	Description and classification	VOCs	4	1	4	1	1	1	—	—	—	1	1	1	5
		Metals	4	1	4	1	1	1	—	—	—	—	—	—	5
BG-5 Oil Drum Storage Area	Description and classification	VOCs	10	1	10	1	1	1	—	—	—	1	1	1	11
		SVOCs	5	1	5	1	1	1	—	—	—	1	1	1	6
		Metals	10	1	10	1	1	1	—	—	—	—	—	—	11
Spent Acid Holding Pond	Description and classification	VOCs	27	1	27	3	1	3	—	—	—	2	1	2	30
		Inorganics	27	1	27	3	1	3	—	—	—	—	—	—	30
		Metals	27	1	27	3	1	3	—	—	—	—	—	—	30
Plating Wastewater Disposal Area[3]	Description and classification	VOCs	10	1	10	1	1	1	—	—	—	1	1	1	11
		Metals	10	1	10	1	1	1	—	—	—	—	—	—	11

Table 2-2

Summary of Sampling Effort
Techalloy Company, Inc.
Union, Illinois
(Continued)

Sample Matrix	Field Parameters	Laboratory Parameters (as defined at QAPP Table 2-12.1 to 2-12.3)	Investigative			Field Duplicate			Field Blank			Matrix Spike/ Matrix Spike Duplicate[1]			Matrix Total[2]
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Plating Wastewater Disposal Area (cont.)	Description and classification (cont.)	CN	10	1	10	1	1	1	—	—	—	—	—	—	11
Concrete Evaporation Pad[3]	Description and classification	VOCs	18	1	18	2	1	2	—	—	—	1	1	1	20
		SVOCs	9	1	9	1	1	1	—	—	—	1	1	1	10
		Metals	18	1	18	2	1	2	—	—	—	—	—	—	20
Background soils	Description and classification	Metals	6	1	6	1	1	1	—	—	—	—	—	—	7
		SVOCs	6	1	6	1	1	1	—	—	—	—	—	—	7
SWMU Groundwater															
Wire slag disposal area	pH, temperature, specific conductance	VOCs	1	1	1	—	—	—	—	—	—	—	—	—	1
		SVOCs	1	1	1	—	—	—	—	—	—	—	—	—	1
		Metals-filtered	1	1	1	—	—	—	—	—	—	—	—	—	1
		Metals-unfiltered	1	1	1	—	—	—	—	—	—	—	—	—	1
		TSS	1	1	1	—	—	—	—	—	—	—	—	—	1

Table 2-2

Summary of Sampling Effort
Techalloy Company, Inc.
Union, Illinois
(Continued)

			Investigative			Field Duplicate			Field Blank			Matrix Spike/ Matrix Spike Duplicate[1]			
Sample Matrix	Field Parameters	Laboratory Parameters (as defined at QAPP Table 2-12.1 to 2-12.3)	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	Matrix Total[2]
BG-5 oil drums	pH, temperature, specific conductance	VOCs	1	1	1	—	—	—	—	—	—	—	—	—	1
		SVOCs	1	1	1	—	—	—	—	—	—	—	—	—	1
		Metals-filtered	1	1	1	—	—	—	—	—	—	—	—	—	1
		Metals-unfiltered	1	1	1	—	—	—	—	—	—	—	—	—	1
		TSS	1	1	1	—	—	—	—	—	—	—	—	—	1
Spent acid holding pond	pH, temperature, specific conductance	VOCs	5	1	5	1	1	1	1	1	1	1	1	1	7
		SVOCs	1	1	1	1	1	1	1	1	1	1	1	1	1
		Inorganics	5	1	5	1	1	1	1	1	1	—	—	—	7
		Metals-filtered	5	1	5	1	1	1	1	1	1	—	—	—	7
		Metals-unfiltered	5	1	5	1	1	1	1	1	1	—	—	—	7
		TSS	5	1	5	1	1	1	1	1	1	—	—	—	7
Plating wastewater disposal area[3]	pH, temperature, specific conductance	VOCs	1	1	1	—	—	—	—	—	—	—	—	—	2
		SVOCs	1	1	1	—	—	—	—	—	—	—	—	—	1
		Metals-filtered	1	1	1	—	—	—	—	—	—	—	—	—	1

Table 2-2

Summary of Sampling Effort
Techalloy Company, Inc.
Union, Illinois
(Continued)

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative			Field Duplicate			Field Blank			Matrix Spike/ Matrix Spike Duplicate[1]			Matrix Total[2]
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Groundwater (Cont.)															
Background groundwater	pH, temperature, specific conductance	VOCs	6	1	6	1	1	1	1	1	1	1	1	1	8
		SVOCs	6	1	6	1	1	1	1	1	1	1	1	1	8
		Metals-filtered	6	1	6	1	1	1	1	1	1	—	—	—	8
		Metals-unfiltered	6	1	6	1	1	1	1	1	1	—	—	—	8
		TSS	6	1	6	1	1	1	1	1	1	—	—	—	8
Total			19	1	19	3	1	3	3	1	3	2	1	2	25
Phase II															
Soil and Groundwater															
New monitoring wells	pH, temperature, specific conductance	Dependent on Phase I results													
Matrix, number, and analyses dependent on Phase I results															

Notes: Matrix totals do not include trip blank samples; VOC trip blank samples will be shipped and analyzed at a frequency of one per shipping container of aqueous VOC samples. SVOCs include polyaromatic hydrocarbons (PAHs).

Two soil samples from boring CP-03 (Concrete Evaporation Pad area) will be analyzed for the plating wastewater disposal area parameters due to the proximity of the wastewater area. The analyses of these two samples are counted with the plating wastewater disposal area samples.

[1]MS/MSDs are not additional samples, but are instead investigative samples on which MS/MSD analyses are performed. MS/MSD analyses are for organic samples only and requires the sample to be collected at double the volume specified for aqueous media. Duplicate/spike analyses will be performed for inorganic samples.

[2]The matrix total does not include trip blank samples, MS/MSDs and duplicate/spike samples. One trip blank sample will be shipped with every shipment container of aqueous VOA samples.

[3]The groundwater sample will be collected from existing monitoring well MW-10.

[4]One groundwater sample will be collected from each of the 13 existing monitoring wells.

Table 2-2

Summary of Sampling Effort
Techalloy Company, Inc.
Union, Illinois
(Continued)

Sample Matrix	Field Parameters	Laboratory Parameters (as defined at QAPP Table 2-12.1 to 2-12.3)	Investigative			Field Duplicate			Field Blank			Matrix Spike/ Matrix Spike Duplicate[1]			Matrix Total[2]
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Existing monitoring wells and probe sample near SW-21 (cont.)	pH, temperature, specific conductance (cont.)	TSS	13	1	13	2	1	2	2	1	2	—	—	—	17
Background groundwater	pH, temperature, specific conductance	VOCs	6	1	6	1	1	1	1	1	1	1	1	1	8
		SVOCs	6	1	6	1	1	1	1	1	1	1	1	1	8
Background groundwater (cont.)	pH, temperature, specific conductance (cont.)	Metals-filtered	6	1	6	1	1	1	1	1	1	—	—	—	8
		Metals-unfiltered	6	1	6	1	1	1	1	1	1	—	—	—	8
		TSS	6	1	6	1	1	1	1	1	1	—	—	—	8
Phase II															
Soil and Groundwater															
New monitoring wells	pH, temperature, specific conductance	Dependent on Phase I results													
Matrix, number, and analyses dependent on Phase I results															

[1]MS/MSDs are not additional samples, but are instead investigative samples on which MS/MSD analyses are performed. MS/MSD analyses are for organic samples only. Duplicate/spike analyses will be performed for inorganic samples.
[2]The matrix total does not include trip blank samples, MS/MSDs and duplicate/spike samples. One trip blank sample will be shipped with every shipment container of VOA samples.
[3]Two soil samples from boring CP-03 (Concrete Evaporation Pad area) will be analyzed for the plating wastewater disposal area parameters due to the proximity of the wastewater area. The analyses of these two samples are included with the plating wastewater disposal area samples.
[4]Inorganics to be analyzed at MW-5, MW-5D, and MW-7.

Company, Inc. (Techalloy), Union, Illinois. The Consent Order was signed by U.S. EPA and Techalloy on 27 January 1993. The five SWMUs are listed below:

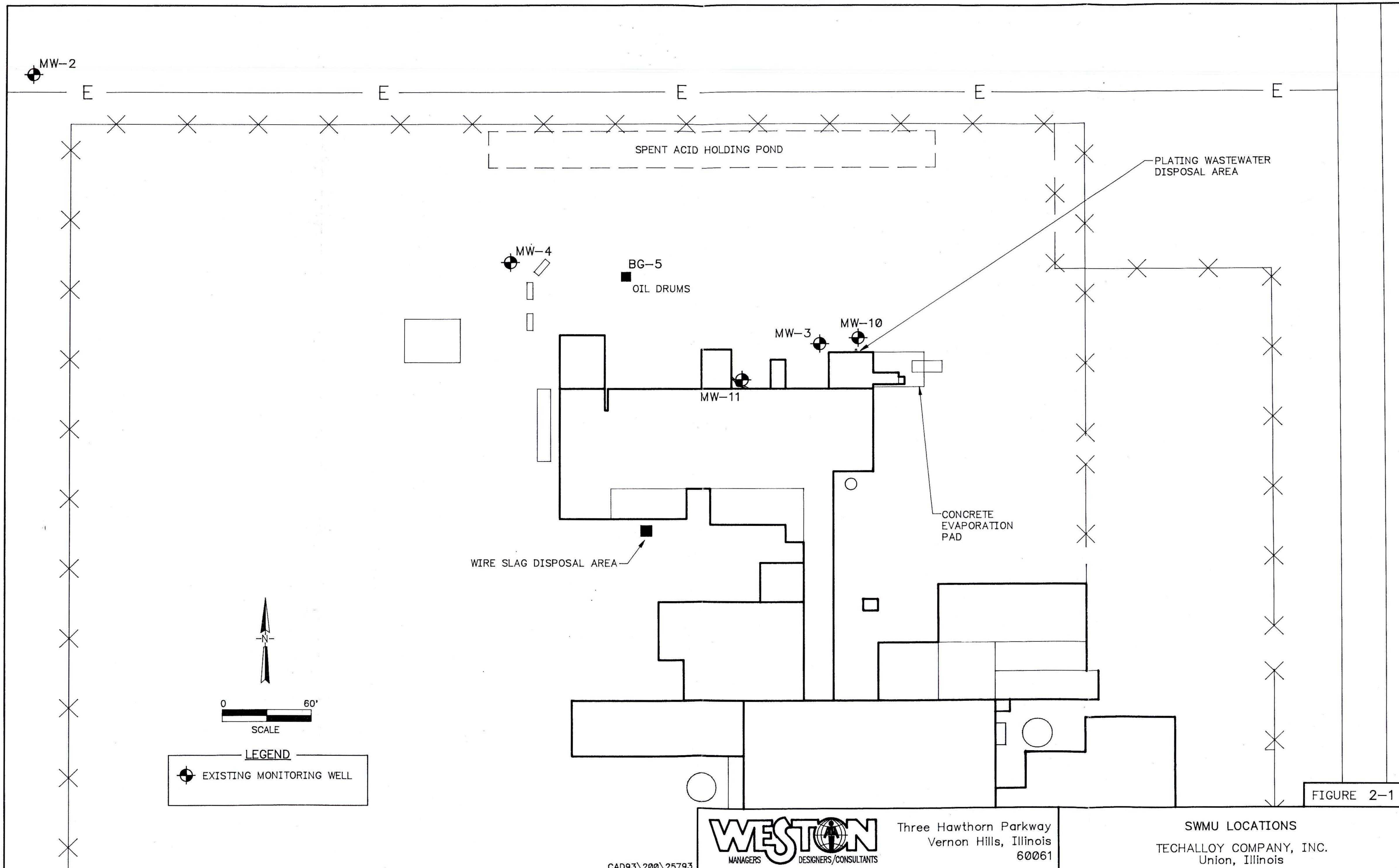
- Wire slag disposal area.
- BF-5 oil drums.
- Spent acid holding pond.
- Plating wastewater disposal area.
- Concrete evaporation pad.

The locations of these five units are depicted in Figure 2-1.

The Phase I activities are designed to determine the vertical and horizontal extent and concentrations of constituents in the surrounding soil and groundwater at each of the SWMUs in question.

The Phase I source characterization activities will consist of the advancement of soil borings in and around each SWMU area. The borings will be advanced through the vadose zone soils to determine the presence, nature, magnitude, and lateral and vertical extent of constituents potentially related to each SWMU in question. The determination of the number of borings to be advanced in and around each SWMU area was based on the size of the SWMU, the activities associated with it and the proximity to the sampling areas around adjacent SWMUs. Borings have been located within the active area of each SWMU to determine the potential impact to the soil. Borings have been located outside the perimeter of each SWMU area in each potential direction of migration to determine the potential lateral and vertical extent of any impact. The borings will be advanced above the water table which lies at approximately 9 feet below ground surface (bgs). Two soil samples will be collected from each boring to allow visual classification of the soils. Two soil samples will also be collected for laboratory analysis at each boring location to determine the vertical distribution of constituents in the vadose zone soils. The samples will be collected from 1 to 2 feet below the native soil surface and 5 to 6 feet bgs, above the capillary fringe of the water table.

To advance the soil borings, Roy F. Weston, Inc. (WESTON®) will employ the use of a Geoprobe hydraulic press. The Geoprobe unit provides rapid advancement of borings and


MW-2
E
SPENT ACID HOLDING POND
PLATING WASTEWATER DISPOSAL AREA
MW-4
BG-5
OIL DRUMS
MW-3
MW-10
MW-11
CONCRETE EVAPORATION PAD
WIRE SLAG DISPOSAL AREA
N
0
60'
SCALE
LEGEND
EXISTING MONITORING WELL
FIGURE 2-1
CAD93\200\25793
WESTON
MANAGERS
DESIGNERS/CONSULTANTS
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Vernon Hills, Illinois
60061
SWMU LOCATIONS
TECHALLOY COMPANY, INC.
Union, Illinois

sample collection with minimal soil cuttings generated. The Geoprobe will reduce the time and expense required to collect the soil and groundwater samples specified in this FSP. It will also eliminate the time and expense required to characterize and dispose of potentially contaminated soil cuttings.

The Geoprobe soil and groundwater sampling procedures are described in Section 3. The following is a description of the drilling locations and sampling activities to be performed at each SWMU area.

Wire Slag Disposal Area

Two soil borings (WS-01 and WS-02) will be advanced near the dumpster containing the wire slag (Figure 2-2). Because the surrounding area is covered with concrete, impact to the underlying soils is considered unlikely. Therefore, only two soil borings will be advanced to characterize this potential source area. The two borings will be located immediately west and east of the dumpster, respectively, to determine if soils have been impacted. The borings will be advanced through the concrete surface and two vadose zone soil samples will be collected for analysis from each boring (Table 2-2). Soil samples will be collected at 1 to 2 feet below the soil/backfill interface and at 5 to 6 feet bgs, above the capillary fringe of the water table.

Boring WS-01, located downgradient and west of the dumpster will be advanced below the water table to allow for collection of a groundwater sample. The groundwater analysis (Table 2-2) will determine if constituents related to this SWMU have migrated vertically to the groundwater pathway.

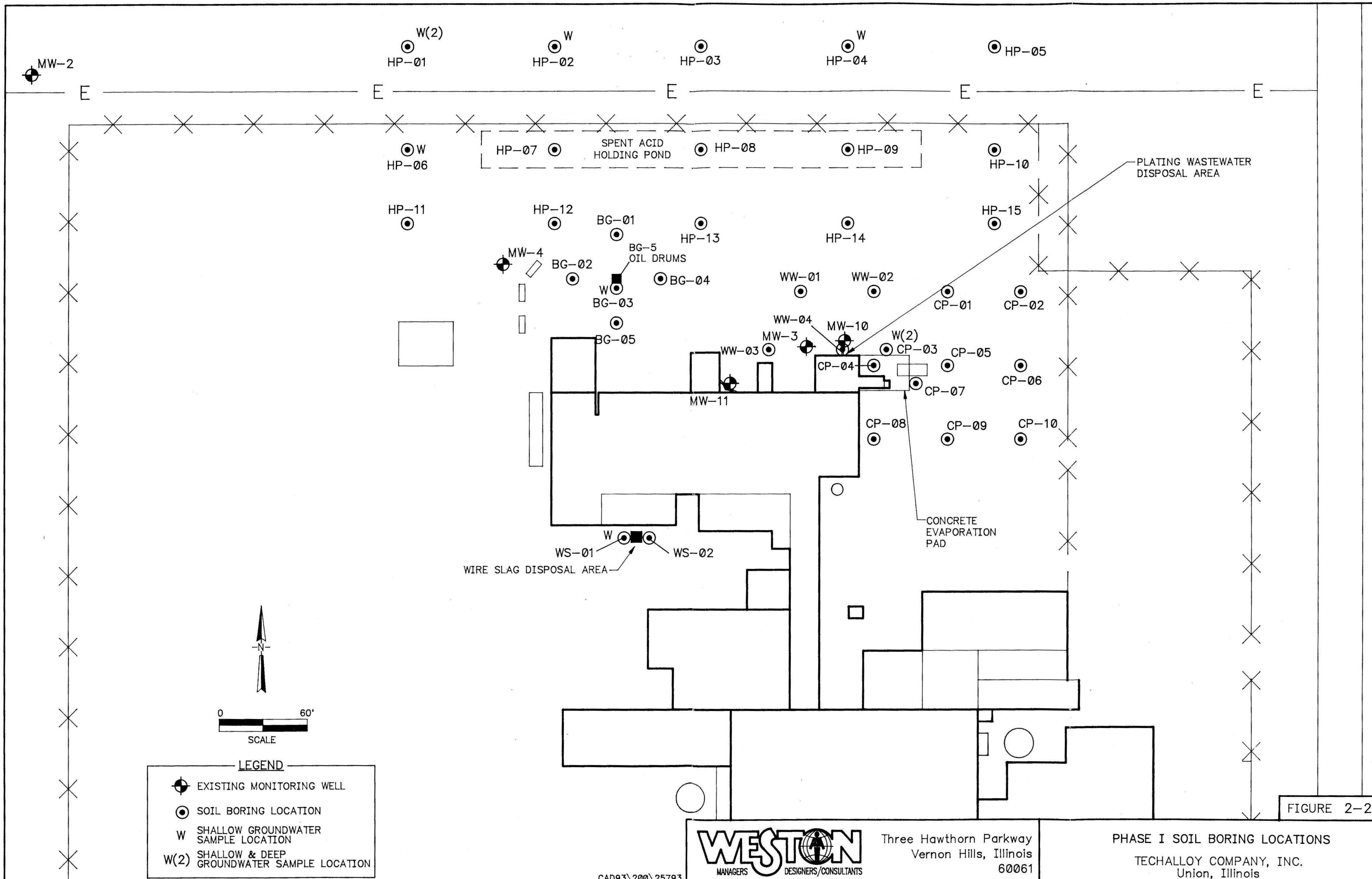
BG-5 Oil Drums

Five soil borings (BG-01 through BG-05) will be advanced near the former BG-5 oil drum staging area to characterize this potential source area (Figure 2-2). Boring BG-03 will be located at the center of the former drum staging location. The other four borings will be located 30 feet to the north, south, east, and west of the unit to determine the lateral extent of potential constituent migration. This placement of the borings encompasses the drum staging area and the area north of the facility structure and south of the spent acid holding pond sampling area. Vadose zone soil samples will be collected for analysis from 1 to 2 feet below the native soil surface, to avoid sampling any surficial fill material (if present). Vadose zone soil samples will also be collected at 5 to 6 feet bgs, above the capillary fringe of the water table. Boring BG-03, located at the center of the BG-5 area will be advanced below the water table to allow for collection of a groundwater sample to determine if constituents related to the oil drums have migrated vertically to the groundwater pathway (Table 2-2).

Spent Acid Holding Pond

Fifteen soil borings (HP-01 through HP-15) will be advanced in and around the former holding pond to characterize the magnitude and lateral and vertical extent of potential constituent migration from this potential source area (Figure 2-2). Borings HP-07 through HP-09 will be advanced through the bottom of the holding pond to characterize the constituents that may have infiltrated the basal soil. The base of the pond is approximately 4 feet bgs and approximately 3 feet above the capillary fringe of the water table. One vadose zone soil sample will be collected from within this 3-foot interval from each of the three borings for analysis. This sampling depth is approximately 5 to 6 feet bgs. These three samples will be collected with a small diameter manually-driven bucket auger.

The remaining 12 borings will be located around the perimeter of the holding pond. The boring locations consist of three east-west rows of five borings. The boring locations are spaced 100 feet east-west and 70 feet north and 50 feet south of the long axis of the holding pond (Figure 2-2). This placement of the borings encompasses the perimeter of the holding pond. The borings extend from immediately north of the sampling areas that encompass



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Three Hawthorn Parkway
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FIGURE 2-2

PHASE I SOIL BORING LOCATIONS

TECHALLOY COMPANY, INC.
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the BG-5 oil drum, plating wastewater, and concrete evaporation pad SWMUs to north of the north fence line of the operational portion of the site. The perimeter borings will be advanced through the vadose zone soils with samples collected for analysis at 1 to 2 and 5 to 6 feet bgs at each location (Table 2-2).

Three borings located on the downgradient side (northwest) of the pond (HP-01, HP-02, and HP-06) and one boring located downgradient (northwest) of the east end of the pond (HP-04) will be advanced below the water table for collection of shallow groundwater samples (Figure 2-2). These groundwater samples will be analyzed to determine if constituents associated with the pond have migrated vertically to the groundwater pathway (Table 2-2).

The boring at the downgradient (northwest) corner of the grid (HP-01) will be continued to the base of the aquifer to allow for the collection of a groundwater sample at the base of the aquifer. This sample will be analyzed to determine if chemical constituents originating from the holding pond are present at the base of the aquifer at this specific point in the groundwater pathway (Table 2-2).

Plating Wastewater Disposal Area

Four soil borings (WW-01 through WW-04) will be advanced near the plating wastewater discharge area to determine the magnitude and lateral and vertical extent of potential constituent migration from this potential source area (Figure 2-2). One soil boring (WW-04) will be advanced adjacent to the suspected point of discharge. Three borings (WW-01, WW-02, and WW-03) will be advanced 50 feet northwest, northeast, and west, respectively, of the suspected discharge point. This placement of the borings encompasses the area potentially impacted by discharged plating wastewater. The borings will cover the area north of the facility structure, east of the sampling area around the BG-5 oil drum SWMU, south of the sampling area around the spent acid holding pond, and west of the sampling area around the concrete evaporation pad. The borings will be advanced through the vadose zone, and analytical samples will be collected at 1 to 2 feet and 5 to 6 feet bgs to characterize the horizontal and vertical extent of constituents related to this potential source area (Table 2-2).

Boring CP-03 is located on the northern fringe of the concrete evaporation pad, and 30 feet east of the suspected discharge point of plating wastewater. Sampling at this location will determine the potential impact from both of these SWMUs.

The soil samples from boring CP-03 will be analyzed for the plating wastewater parameters (i.e., VOCs, selected Appendix IX metals and cyanide) and are therefore included in the ten soil samples indicated on Table 2-2 for the plating wastewater area. The VOC and metals results will also be applicable to the concrete evaporation pad area but are not included in the 18 indicated samples for the evaporation pad area.

Shallow monitoring well MW-10 is situated approximately 10 feet north of the suspected wastewater discharge point. In conjunction with the existing monitoring well sampling, this well will be sampled for the SWMU area parameters presented in Table 2-2 under plating wastewater disposal area groundwater sampling. This analysis will determine whether constituents originating in this area have migrated vertically to the groundwater pathway (Table 2-2).

Cyanide is a parameter of concern only at the plating wastewater SWMU. Monitoring well MW-10 was sampled in July 1992, the result of analysis for cyanide at a reporting limit of 0.010 mg/L was nondetect. Based on this result it has been determined that cyanide has not reached the groundwater pathway in this SWMU area. Therefore, cyanide is not included in the plating wastewater area groundwater analysis (Table 2-2). Cyanide is not a parameter of concern in the other four SWMU areas. Therefore cyanide is not included in any other oil or groundwater analyses.

<u>**Concrete Evaporation Pad**</u>

Ten soil borings (CP-01 through CP-10) will be advanced in and around the concrete evaporation pad to determine the magnitude and lateral and vertical extent of constituent migration from this potential source area. The borings will be advanced through the vadose zone soils and samples will be collected for analyses at 1 to 2 feet and 5 to 6 feet bgs (Table 2-2).

Borings (CP-01, CP-02, CP-05, CP-06, CP-08, CP-09, and CP-10) will be advanced around the perimeter of the evaporation pad. These borings are spaced 50 feet north-south and east-west from boring CP-04 (located within the evaporation pad) to determine the lateral and vertical extent of potential constituent migration. Boring CP-07 is located immediately east of the pad and boring CP-03 is located immediately north of the pad to determine the impact to the underlying soils immediately adjacent to the pad.

As indicated earlier, due to the proximity of the plating wastewater disposal area to the concrete evaporation pad, vadose zone soil samples collected from boring CP-03 will be analyzed for the plating wastewater parameters (VOCs, selected Appendix IX inorganics and cyanide). This analysis will also encompass the evaporation pad parameters (VOCs and selected Appendix IX metals) and will provide data relevant to both SWMUs. This placement of the borings surrounds the evaporation pad on the south, east and north sides of the pad. This sampling area extends west to the plating wastewater sampling area, north to the holding pond sampling area, and east and south to encompass the area potentially impacted by the evaporation pad.

Boring CP-03, located on the north side of the pad, will be advanced below the water table to allow for collection of a shallow groundwater sample. The sample analysis will determine the magnitude of the impact to the groundwater pathway at this location. The boring will then be advanced to the base of the aquifer at 35 feet bgs for the collection of a deep groundwater sample. The deep sample analysis will determine the impact to the deep portion of the groundwater pathway at this location. The groundwater analysis from boring CP-03 is included with the total number of concrete evaporation pad groundwater analyses on Table 2-2.

Background

Six soil borings (BK-01 through BK-06) will be advanced at locations upgradient (southeast) of the Techalloy facility (Figure 2-3). Each boring will be sampled at 1 to 2 feet and 5 to 6 feet bgs, similar depths as those borings on site. Each boring will also be advanced below the water table for collection of a shallow groundwater sample. The soil and groundwater samples will be analyzed according to the scheme outlined in Table 2-2. The purpose of

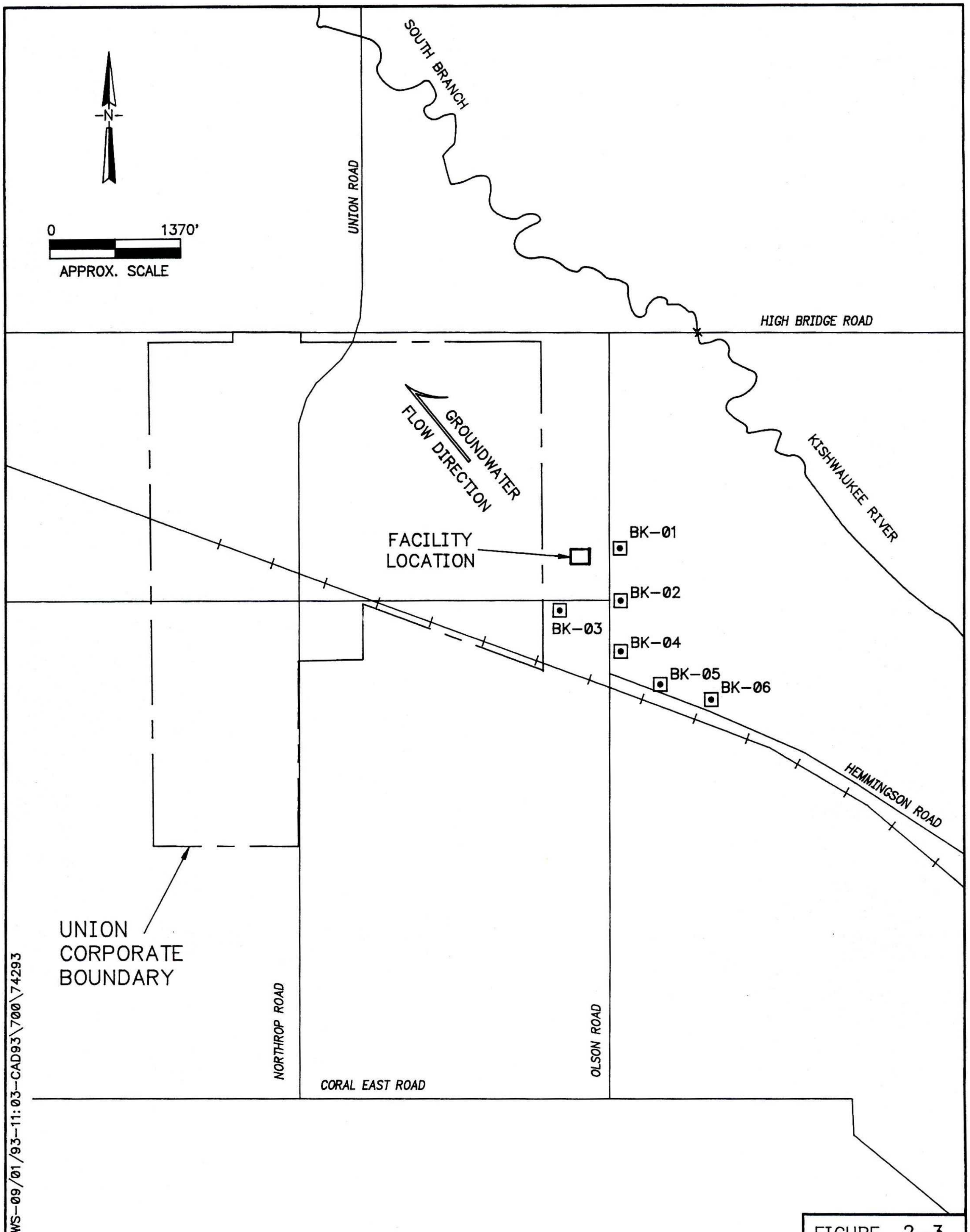

FIGURE 2-3

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Three Hawthorn Parkway
Vernon Hills, Illinois
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PHASE I BACKGROUND
SOIL BORING LOCATIONS
TECHALLOY COMPANY, INC.
Union, Illinois

these analyses is to establish background concentrations of constituents indigenous to the area. The background concentrations will be compared statistically to concentrations detected on site to establish their significance. Assuming a roughly normal distribution, the T-statistic will be used to provide a 95 percent confidence interval on concentrations.

The exact locations of the six background borings will depend on physical and legal access and will be finalized prior to initiating the on-site boring activities. To minimize the potential obsticals involved in physical and legal access for the borings, the borings have been located along the township road right-of-ways. This will allow for easy physical access to the boring locations and access permission from one source.

Background Boring BK-01 will be located approximately 500 feet north of the intersection of Olson and Jefferson Roads on the east side of Olson Road. Boring BK-02 will be located immediately east of the intersection of Olson and Jefferson Roads. Boring BK-03 will be located approximately 500 feet west of the intersection on the south side of Jefferson Road. Boring BK-04 will be located approximately 500 feet south of the intersection on the east side of Olson Road. Boring BK-05 will be located approximately 500 feet east of the intersection of Olson and Hemmingson Roads on the north side of Hemmingson Road. Boring BK-06 will be located approximately 500 feet east of boring BK-05 on the north side of Hemmingson Road.

Analyses of the background soil and groundwater samples are presented in Table 2-2.

Groundwater

Based on the available information gathered to date on the Techalloy facility, groundwater is known to be the primary migration pathway for constituents migrating from the facility. WESTON's report, "Phase II Soil and Groundwater Investigation," dated June 1991 documented the magnitude and lateral and vertical extent of the downgradient constituent migration in the groundwater. Therefore, pathway characterization under Phase I of the

RFI will consist of the previously-described groundwater sampling at each SWMU and the measuring of water levels and sampling of the existing monitoring wells.

The recording of water table elevations in on- and off-site monitoring wells will be performed to confirm the current groundwater flow direction. Two rounds of water levels will be recorded during the RFI.

The 13 existing monitoring wells will be sampled for VOCs, SVOCs, and metals analysis to establish the current distribution of constituents in on- and off-site groundwater. Three of the 13 monitoring wells (MW-5, MW-5D, and MW-7) will also be sampled for ammonia, chloride, nitrate, and sulfate. Six groundwater samples will also be collected from soil borings advanced below the water table at six background locations upgradient of the Techalloy facility. The upgradient groundwater analytical results will be compared statistically to the on-site and downgradient results to determine the significance of those detections. This information, in addition to the previous plume characterization work, will characterize the current groundwater pathway scenario.

2.3 PHASE II INVESTIGATION ACTIVITIES

The Phase II source characterization activities are contingent on the results of the Phase I analyses. If the Phase I results do not meet the objectives of the RFI, additional sample locations will be identified and sampled under a Phase II effort. For example, if the horizontal and vertical extent of constituent migration is not fully identified around a particular SWMU, additional borings will be advanced and sampled in a manner consistent with the Phase I methods to fully characterize the area.

The Phase II pathway characterization activities are contingent on the analytical results of the Phase I activities. If determined to be necessary, additional groundwater monitoring wells will be installed and sampled to characterize constituent concentrations and/or flow characteristics in specific areas.

2.4 POTENTIAL RECEPTORS

The potential receptors of constituents migrating downgradient of the facility with groundwater have been identified. Those residences with private water wells, located in proximity to the groundwater plume and exhibiting VOCs in previous chemical analyses, have been designated for future testing. In compliance with the consent order, the details of the potential receptor investigative activities have been presented to U.S. EPA in the "Private Well Sampling Plan," dated February 1993.

SECTION 3

FIELD INVESTIGATION PROTOCOLS

The following subsections describe the procedures to be used during the RFI at the Techalloy facility. Specifically, these subsections contain protocols for soil borings, sampling of soil and groundwater, sample collection, field testing, and monitoring well installation.

3.1 SOIL BORING SAMPLING

Soil samples will be collected for chemical analysis from two distinct depths in each soil boring except borings HP-07 through HP-09, which will be sampled at one depth. Samples will be analyzed according to the analytical scheme outlined in Table 2-2. The following steps will be used for the advancement and sampling of all soil borings:

- A hydraulic push/pull mechanism (Geoprobe) mounted on a four-wheel-drive truck will be utilized to advance all soil and groundwater sampling borings.

- The working end of the Geoprobe and all boring equipment, tools, and materials will be decontaminated prior to advancing a boring at each location in accordance with the protocols presented in Table 3-1. Provisions will be made to prevent equipment, tools, and materials from coming into contact with surface soils.

- The Geoprobe will advance a decontaminated 1-inch diameter by 2-foot-long bore sampler with a retractable drive point to the upper limit of the first desired sampling interval. The sampling equipment will be decontaminated in accordance with the protocols in Table 3-2.

- If the sampler meets with resistance and will not push to a sufficient depth, a hydraulic hammer will be used to advance the sampler.

- At the desired sample depth, the retractable drive point is released and the sampler advanced through the desired interval. Soil from this interval is collected into the sampling sleeve.

Table 3-1

**Standard Decontamination Protocol for Drilling/Boring Equipment
Techalloy Company, Inc.
Union, Illinois**

Step	Description
1	The drill rig or Geoprobe and other equipment/materials will be moved to the designated decontamination area at the Techalloy site.
2	All drilling casing and related drilling equipment will be supported above ground and individually steam cleaned in a manner to allow for retaining the water runoff.
3	The control panel and working area of the rig will be steam cleaned in a manner to allow for retaining the water runoff.
4	All decontaminated well materials (i.e., well casing, well screen, etc.) will be placed on clean polypropylene sheeting until used.
5	The water runoff from the decontamination procedure will be collected in a trough. This water will periodically be pumped into 55-gallon barrels for storage as described in Section 9.

Note:
All steam cleaning will be performed using pressurized steam. Steam cleaning will continue until all visible contamination, oil, grease, etc., is removed.

Table 3-2

Standard Decontamination Protocol for Sampling Equipment
Techalloy Company, Inc.
Union, Illinois

Step	Description
1	Scrub equipment thoroughly with soft bristle brushes in a low-sudsing phosphate-free, detergent solution.
2	Rinse equipment with tap water by submerging and/or spraying and allow to air dry for 1 to 2 minutes.
3	Rinse equipment with deionized water by spraying until dripping.
4	Rinse equipment a second time with deionized water by spraying until dripping.
5	Place equipment on polypropylene or aluminum foil and allow to air dry for 5 to 10 minutes.
6	Wrap equipment in polypropylene or aluminum foil for handling and/or storage until next use.

Note:
The drippings from decontamination will be retained in 55-gallon drums and handled/stored as described in Section 9. If the sampling equipment is used to collect oil or adhesive types of contmainated media, or the presence of organic residue is suspected, a rinse via spraying with isopropanol will be included after Step 2.

- The sampler is retrieved from the borehole and samples are extruded into appropriate laboratory-prepared sample containers. The VOC sample will be collected first. No mixing or compositing of the VOC sample material will be performed in order to minimize the potential loss of volatile constituents. The remaining sample material will be homogenized and placed into the remaining appropriate sample containers. The homogenizing procedure is presented in Subsection 3.7.

- Following sample collection, each soil core will be logged by a qualified WESTON geologist. All soil descriptions will be recorded on a WESTON boring log (Figure 3-1).

- A decontaminated drive point sampler will be reinstalled into the Geoprobe and the unit advanced to the top of the next desired sample interval where the procedure will be repeated.

Three soil samples will also be collected from three discrete soil borings advanced through the bottom of the acid holding pond. The steps for collection of these samples are given below:

- Borings will be advanced using a decontaminated, manually-driven small-diameter bucket auger.

- The bucket auger will be advanced manually to the desired sampling depth below the base surface of the holding pond.

- After advancing the bucket auger through the desired sample interval, the auger will be retrieved and the soil transferred directly to the appropriate laboratory-prepared sample containers. The VOC portion will be transferred as quickly as possible. No mixing or compositing of the VOC sample material will be performed in order to limit the potential loss of VOCs from the sample.

- Following the containerizing of the VOC sample, the remaining sample material will be homogenized and placed in the appropriate remaining sample containers. The homogenizing procedure is presented in Subsection 3.7.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION		PAGE NO. of	HOLE NO.

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

PAGE NO. of | HOLE NO.

FIGURE 3-1

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GEOLOGIC DRILLING LOG FORM

TECHALLOY COMPANY, INC.
Union, Illinois

- A portion of the sample collected will be logged by a qualified WESTON geologist. All soil descriptions will be recorded on a WESTON boring log form (Figure 3-1).

3.2 SOIL BORING GROUNDWATER SAMPLING

At seven soil boring locations (WS-01, BG-03, HP-01, HP-02, HP-04, HP-06, and CP-03), the borings will be continued below the water table to facilitate the collection of shallow groundwater samples. At two locations (CP-03 and HP-01), the borings will be continued to the base of the aquifer for collection of deep groundwater samples (Figure 2-2). The groundwater samples will be analyzed according to the analytical scheme outlined in Table 2-2. The following steps will be used for the collecting of groundwater samples from the soil borings:

- The Geoprobe unit will hydraulically advance decontaminated (Table 3-1) 3/4-inch inside diameter (I.D.) galvanized steel rods to a sufficient depth below the water table to allow for infiltration of groundwater. The lead 2-foot rod is slotted for water entrance and is advanced with an expendable aluminum cast tip.

- The probe will be lifted slightly off the aluminum drive tip to increase water infiltration to the probe.

- Groundwater samples will then be collected by the methods described below.

- Groundwater will be purged with polyethylene tubing and a slow-flow peristaltic pump.

- Groundwater will be purged until conductivity, temperature, and pH has stabilized or when five volumes have been purged. Note 3/4-inch rods contain very low volumes (0.023 gallons/feet water column) and act as a relatively instantaneous point sample.

- Groundwater samples will then be collected using polyethylene tubing and a peristaltic pump, set at a slow-flow rate.

- The tubing will be inserted and a peristaltic pump, set at a low-flow rate will be used to draw groundwater through the tubing directly into laboratory-prepared sample containers for the additional analyses. Groundwater samples to be analyzed for VOCs, SVOCs, ammonia, chloride, nitrate, sulfate, and TSS will be collected and submitted to the laboratory without being field filtered. Two samples for metals analysis will be collected at each groundwater sampling location. One sample will be field filtered and the second sample will remain unfiltered. Both the filtered and unfiltered samples will be submitted to the laboratory for metals analysis.

- The filtered water sample for metals analysis will be passed through an in-line 0.45-micron filter prior to collection in the laboratory-prepared sample container. Sample preservation of the filtered sample will be performed after filtration.

- A sterile, unused, length of tubing or tubing and check valve will be used at each sample location and each discrete sampling depth to collect each discrete groundwater sample.

3.3 WATER LEVEL MEASUREMENT

Two rounds of water level measurements will be collected over the course of the Phase I investigative activities. Water level measurements will be recorded in the following manner:

- The depth to the water table in the well and the total depth of the well will be measured with an electrical sounding device (accuracy $\pm$0.01 feet). The depth to water and the time of measurement will be recorded in a field logbook. The reference point for these depths will be the top of the casing of the well. The elevation of the top of the casing will be established relative to mean sea level (MSL) in a field survey conducted during the RFI. A registered Professional Land Surveyor will determine the elevations at the conclusion of the field investigative activities.

- Water table elevations will be plotted on an area map and water level contours will be constructed to determine horizontal flow conditions.
- Water table elevations measured in shallow and deep wells will be compared to establish the vertical component of groundwater flow.
- Groundwater depth and flow direction will be determined on and off site.

An SOP for water level measurements has been included in Appendix B.

3.4 GROUNDWATER MONITORING WELL INSTALLATION

If the results of the Phase I RFI activities determine that additional groundwater monitoring points are required, additional groundwater monitoring wells will be installed under Phase II of the RFI. The additional shallow groundwater monitoring wells will be installed to screen the water table and uppermost portion of the aquifer. The shallow well screens will be installed from 2 feet above to 8 feet below the water table. If additional deep monitoring wells are required to monitor water quality at the base of the aquifer, the well screens will be installed to screen the bottom 10 feet of the aquifer.

The following steps will be used during the installation of all groundwater monitoring wells:

- The borings for shallow monitoring wells will be advanced to their desired depths below the water tables, utilizing a high-torque drill rig and 4.25-inch hollow-stem augers (HSAs).
- The borings for deep monitoring wells will be advanced to their desired depths utilizing mud rotary drilling techniques.
- The working end of the drill rig and all drilling equipment, tools, and materials will be decontaminated prior to drilling at each location in accordance with protocol presented in Table 3-1. Provisions will be made to keep equipment, tools, and materials from coming into contact with surface soils.

- Split-spoon sampling will be conducted at each boring location at 5-foot intervals through the entire borehole depth using standard split-spoon sampling techniques. Split-spoon samplers will be advanced ahead of the lead auger or mud rotary borehole for undisturbed soil samples.

- Following each split-spoon sample collection (Subsection 3.6), each split-spoon soil core will be logged by a qualified WESTON geologist, using the Unified Soil Classification System. All soil descriptions will be recorded on WESTON boring logs (Figure 3-1).

- Each split-spoon sampler will be decontaminated in accordance with the standard decontamination protocol for sampling equipment outlined in Table 3-2.

3.4.1 Monitoring Well Construction

After drilling has been completed, each monitoring well will be constructed as shown in Figure 3-2 using the following methodology:

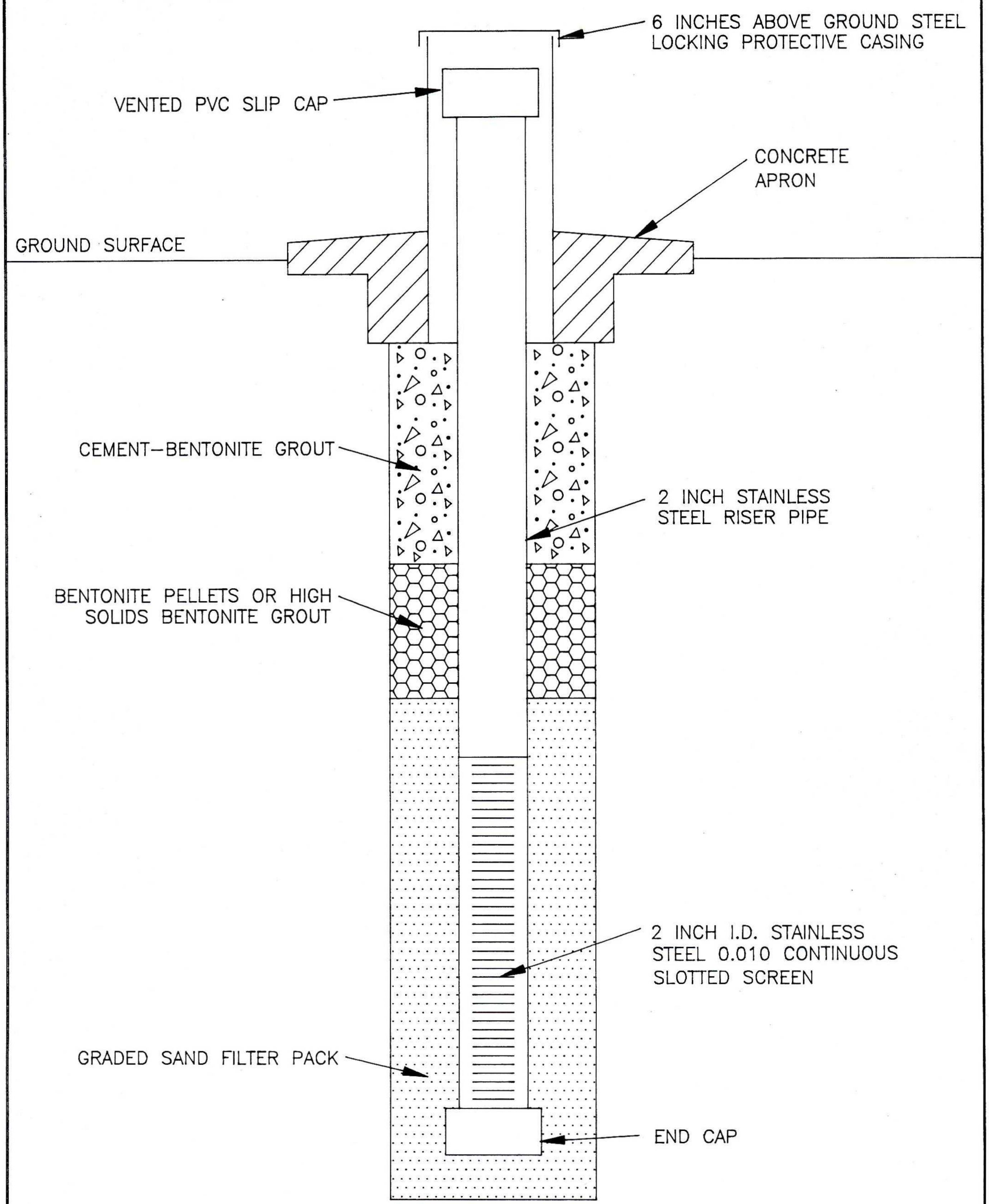
- The wells will be constructed of 2-inch diameter stainless steel piping with flush-threaded couplings. Well screens will be 10 feet in length and will be constructed of stainless steel with continuously slotted 0.010-inch openings.

- The annular space around the screen (the filter pack) will be filled with a well-sorted silica sand which will extend from 6 inches below to 2 feet above the screen.

- After the filter sand pack is in place, the filter pack seal will be constructed. The filter pack seal will consist of 3 feet of bentonite pellets.

- Immediately above the filter pack seal, the annular space seal will be constructed. The remaining annular space will be filled to approximately 5 feet bgs with a cement-bentonite grout (6 parts cement to 1 part bentonite by volume) and placed with a tremie pipe.

- A minimum 36-inch-deep concrete ground surface seal will be installed at the ground surface around each of the monitoring wells. The surface pads will be



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WESTON MANAGERS DESIGNERS/CONSULTANTS	Three Hawthorn Parkway Vernon Hills, Illinois 60061	FIGURE 3–2	MONITORING WELL CONSTRUCTION TECHALLOY COMPANY, INC. Union, Illinois

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MWTYPE4

a minimum of 24 inches in diameter, made of ready-mix concrete, and sloped away from the well to provide a water runoff diversion.

- To provide well protection at all monitoring well locations, a minimum 4-inch i.d. steel casing, 7 feet long, with locking cap will be installed over the stainless steel well casing. This protective casing will be embedded at least 5 feet into the concrete surface seal before the concrete has had time to set. Key-alike locks will be provided for each casing.

3.4.2 Monitoring Well Development

After installation of all monitoring wells, each well will be developed using the following steps:

- A minimum waiting period of 12 hours will be observed prior to development of the newly installed monitoring wells.
- All equipment to be introduced into the well will be decontaminated in accordance with procedures shown in Table 3-2.
- The initial static water level and total depth of the well will be recorded. One well volume will be calculated as follows: height of the water column in the well in feet times 0.16 gallons of water per foot of 2-inch diameter pipe. This value will then be recorded.
- A decontaminated polyethylene bailer will be used to surge and purge the well for a minimum of 30 minutes.
- The well will be developed when a minimum of 10 well volumes has been removed or when sediment-free water is observed, if not observed after the removal of ten well volumes.
- If the well can be purged dry, the well will not be surged. The well will be developed by slowly and gently purging the well dry. The development will be complete when five well volumes have been removed or the well produces sediment-free water, if not observed after the removal of five well volumes.

- During development, measurements of pH, conductivity, and temperature will be recorded. Development will continue until these measurements have stabilized (±0.25 pH units, ±50 µmhos/cm, and ±05.°C and 10 well volumes have been removed. Procedures for measuring these three parameters are described in SOPs presented in Appendix B.

- The volume of water removed from each well and purging time will be recorded.

- All drill cuttings and well development water will be containerized and stored on site in 55-gallon drums. The drums will be stored on site until appropriate disposal action is determined. Each drum will be properly labeled for easy identification of the wastes contained. The drums will be managed as described in Section 9.

3.5 GROUNDWATER MONITORING WELL SAMPLING

One round of groundwater samples will be collected from the 13 existing monitoring wells. No special sequence will be needed because decontaminated disposable bailers will be used for sampling. Each sample will be collected using the following methodology:

- Upon removing the protective cap to the monitoring well riser, the headspace will be monitored with a PID for airborne contaminants. The purpose of this analysis is strictly for health and safety monitoring, not characterization. The measured values will be recorded in the field logbook.

- Equipment to be used in the monitoring wells during sampling procedures will be decontaminated prior to use, in accordance with standard protocols listed in Table 3-2.

- The depth to the water level in the well and the total depth of the well will be measured with an electrical sounding device (accuracy ±0.01 feet). The depth to water and the time of measurement will be recorded. The reference point for these depths will be the top of casing of the well. The elevation of the top of the casing will be established relative to MSL in a field survey conducted during the RFI.

- The volume of standing water in the well will be calculated. Volume of water in a 2-inch diameter well (gallons) + length (feet) x 0.163 (gallons per foot).

- A decontaminated polyethylene bottom-delivery bailer will be used for purging and sample collection.

- A minimum of three purge volumes and a maximum of five purge volumes will be removed before sampling. This water will be containerized in accordance with the protocols described in Section 9.

- At the completion of each well volume removed, a field measurement of pH, conductivity and temperature will be made using the procedures contained in WESTON's SOPs in Appendix B. These values will be recorded in the field logbook.

- After removing the third volume, purging will cease when measurements for all three parameters have stabilized (±0.25 pH units, ±50 μmhos/cm, and ±5°C) for three consecutive readings or after five well volumes have been removed.

- In the unlikely event that the monitoring well purges dry before three volumes have been removed, the well will be allowed to recharge for 15 minutes and then be purged dry again. A water sample will be collected after the well is bailed dry a second time.

- Samples will be collected directly from the bottom-delivery bailer after the well purging has been completed.

- Samples for VOC analysis will be transferred into pre-preserved 40 mil vials. Each vial will be overfilled creating a convex meniscus to eliminate void space in the vial.

- The Teflon-lined caps will be secured on the vials.

- The vials will be inverted, tapped gently, and checked for bubbles. If bubbles are observed, the cap will be removed and the vials will again be overfilled and resealed. This step will be repeated until each vial contains a single-phase sample without bubbles. If the sample has to be discarded and a new sample collected, a new, preserved sample vial will be used to collect the sample. If bubbles persist, an unpreserved sample will be collected for VOC analysis. (The Field Sample Manager will note the absence of the preservative on the sample paperwork and in the field logbook.)

- Samples for the additional analyses will then be transferred into the appropriate sample containers. The sequence for filling the remaining sample containers is as follows: semivolatiles, selected Appendix IX inorganics, cyanide, other inorganics (ammonia, chloride, nitrate, and sulfate) then total suspended solids (TSS).

- All organic samples, ammonia, chloride, nitrate, sulfate, TSS, and the inorganic cyanide aliquot will be submitted to the laboratory unfiltered. Two total metals samples will be collected at each location where groundwater samples will be collected for RCRA metal analysis. One metals sample will be submitted to the laboratory unfiltered, the second sample will be filtered in the field. The filtered water sample for metals analysis will be pumped from a sample container, through an in-line 0.45-micron filter via polyethylene tubing using a peristaltic pump. The filtered groundwater sample will be collected in an unused laboratory-prepared sample container. Sample preservation of the filtered sample will be performed after filtration.

Samples will be analyzed according to the analytical scheme outlined in Table 2-2.

3.6 SPLIT-SPOON SAMPLING PROCEDURES

Following removal from the borehole, the split-spoon sampler will be opened on a clean surface (e.g., polyethylene sheeting). Sample collection will commence immediately upon opening the split-spoon in order to minimize the loss of VOCs. The VOC sample will be collected first as a grab sample. Sample material from several places along the core at the depth of interest will be removed using a decontaminated stainless steel spatula, spoon, or scoop, and placed as quickly as possible into the assigned VOC sample containers. No mixing or compositing will be performed on the VOC sample material, thereby limiting the loss of volatile organic compounds from the sample. The VOC sample container will be filled completely, packing the soil in the container as tightly as possible. The remainder of the sample material will be homogenized and placed in the appropriate remaining sample containers. These samples will be considered composite samples. The homogenization procedure is presented in Subsection 3.7.

All reusable sampling equipment, including the stainless steel spatulas, split spoons, spoons and bowls, will be decontaminated between each sample in accordance with procedures outlined in Table 3-2.

3.7 SAMPLE HOMOGENIZATION PROCEDURES

The homogenizing procedure is designed to increase the probability that a relatively small sample aliquot is representative of a relatively large soil volume removed from a sample location, thereby enhancing the representativeness and reproducibility of the sample. The soil sample material will be placed in a decontaminated stainless steel bowl or tray, and a decontaminated stainless steel spoon or spatula will be used to break up the material into pieces approximately 1/2 inch or less in diameter. The sample material will then be stirred using decontaminated spoons or spatulas so that all of the material at the bottom of the tray or bowl is displaced to the top and vice versa. This action will be repeated at least three times. The homogenizing process will be considered complete when the texture and color of the sample appear uniform throughout. Unless stated elsewhere in this document, the homogenization procedure will be followed for all soil samples, regardless of appearance, in order to ensure consistency.

SECTION 4
FIELD QC SAMPLES

Four types of QC samples will be collected during the Techalloy RFI:

- Field blanks.
- Field duplicates.
- Matrix spikes/matrix spike duplicates.
- Trip blanks.

The purpose for each QC sample is explained in Section 4 of the QAPP. The specific level of QC effort for the Techalloy site sampling activities is shown in Table 2-2, and the sample collection procedures for each QC sample type are detailed in Subsections 4.1 through 4.4.

4.1 FIELD BLANKS

For groundwater samples, one field bland (of the same type) will be collected for every 10 or fewer investigative samples collected in each sampling activity. The field blank samples associated with Geoprobe groundwater sampling will be obtained by pouring ultra pure water through the polyethylene tubing/penstaltic pump sampling device. Field blanks associated with groundwater monitoring well sampling will be collected by pouring ultra pure water over and through a polyethylene bottom-emptying bailer. The filtered metals aliquot for the groundwater monitoring well field blank sample will be filtered in the same manner as the investigative samples. The filtering procedure is described in Subsection 3.5. In each instance, the water from the sampling devices will be collected in the appropriate sample containers. The VOC sample aliquot will be collected first followed by SVOCs, metals, ammonia, chloride, nitrate, sulfate, and TSS sample aliquots. Each field blank will be analyzed for the same parameters as the investigative sample being collected, which will allow for a direct comparison of both sample results. All field blanks will be considered low concentration water samples, and sample containers, handling, and shipment procedures will be used that are in accordance with low level groundwater monitoring well water samples. Each field blank will be documented on a WESTON Chain-of-Custody Form.

4.2 DUPLICATE SAMPLES

Duplicate samples will be collected at selected locations during soil and groundwater sampling on a 1-per-10 sample frequency per matrix, using procedures identical to those used for the investigative samples. Duplicate samples will be analyzed for the same parameters as the investigative samples. Duplicate samples will be collected by alternately filling two sets of sample bottles from the same sample unit (e.g., bail of water, spoon of soil, flowing water source). Duplicate samples will be analyzed for the same parameters as the investigative samples. Each duplicate VOC sample will be collected immediately after the investigative VOC sample in order to minimize the possibility of loss of VOCs during sample collection.

4.3 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected on a 1 per 20 sample (or less) basis for soil, sediment, surface water and groundwater samples. These are not additional samples, but are instead investigative samples assigned for MS/MSD analysis. Therefore, all sample collection procedures are identical to those for other investigative samples of the same matrix (i.e., soil and groundwater). Twice the normal sample volume is required for MS/MSD samples. MS/MSD analyses are only performed for organic parameters. For inorganic analyses, duplicate and spike analyses will be performed at the same frequency as MS/MSDs. Twice the normal volume is also required for samples on which spike/ duplicate analyses will be performed. Each MS/MSD and spike/duplicate sample will be identified as such on the sample chain-of-custody form and will be shipped to the analytical laboratory for all scheduled analyses shown on Table 2-2.

4.4 TRIP BLANKS

For each shipment container containing VOC samples, one trip blank will be included. Two 40-mL glass vials will be required for all trip blanks, and all preservation, handling and packaging will be conducted according to the procedures for groundwater VOCs. The 40-mL vials for each trip blank will be filled under laboratory-type conditions as soon as is practical (given the holding time) prior to the beginning of a sampling event. Preparation of the trip blank will entail the pouring of the ultra pure water into the 40-mL vials (leaving no air space) and carefully securing the caps to ensure the absence of air bubbles. The sealed bottles will be subsequently placed in a sample shipment container. The trip blanks will accompany the sample shipment containers to the site and will remain with the sample shipment containers until received at the laboratory. The trip blank will be documented on a WESTON Chain-of-Custody Form.

4.5 DOCUMENTING SAMPLE LOCATIONS

All soil boring and monitoring well locations will be surveyed for horizontal and vertical documentation, photodocumented, and referenced by recognizable and permanent physical structures (i.e., buildings, light poles) in the nearby area. Reference points will be used to locate each sampling site. Surveyed stakes will be used at sampling locations lacking physical reference points. The leveling survey will be tied to MSL datum that may require an off-site traverse to a national geodetic benchmark. Accuracy of measurements for the level survey will be 1.0 feet for horizontal and 0.01 feet for vertical.

physical reference points. The leveling survey will be tied to MSL datum that may require an off-site traverse to a national geodetic benchmark. Accuracy of measurements for the level survey will be 1.0 feet for horizontal and 0.01 feet for vertical.

SECTION 5
SAMPLE HANDLING

5.1 SAMPLE CONTAINERS AND SAMPLE PRESERVATION

All soil and groundwater samples are expected to be low hazard levels. Table 5-1 lists the required sample containers, sample volumes, sample preservation requirements, and holding times associated with all parameters and media applicable to the Techalloy RFI sampling activities.

5.2 SAMPLE PACKAGING AND SHIPMENT

All samples shipped from the Techalloy facility must be shipped in accordance with U.S. Department of Transportation (DOT) regulations and must comply with Dangerous Goods Regulation [International Air Transport Association (IATA), (1993)] if shipped by air transport.

Following sample collection, the exteriors of all sample containers will be wiped clean with a moist cloth. The filled sample containers will not be sprayed with water during decontamination because this water could contact the sample if the container is not tightly sealed. In preparation for shipment to the WESTON-Gulf Coast Laboratories, all samples will be packaged in accordance with the following procedures:

- Each sample container will be checked to ensure that the container lid is securely tightened.
- Each sample container will be checked to ensure that the sample label has been securely affixed to the container and completely/correctly filled out with the appropriate sample I.D. number, sample, date, and analytical parameters as a minimum requirement.

Table 5-1

Required Sample Containers, Volumes, Preservation, and Holding Times
Techalloy Company, Inc.
Union, Illinois

Material Type	Analysis	Number of Containers	Required Sample Volume	Sample Container Type	Sample Preservation	Sample Holding Time[1]
Soil	VOCs[1,2]	1	4 oz.	4 oz. wide-mouth glass jar with Teflon® - lined cap	Cool to 4°C	14 days for extraction and analysis
	SVOCs	1	4 oz.	4 oz. wide-mouth glass jar with Teflon® - lined cap	Cool to 4°C	14 days for extraction 40 days for analysis.
	Sulfate Nitrate Ammonia Chloride	1	8 oz.	8 oz. wide-mouth glass jar	Cool to 4°C	48 hours[3]
	Metals and cyanide	1	8 oz.	8-oz. wide-mouth glass jar	Cool to 4°C	6 months (28 days for mercury) (14 days for cyanide)
Groundwater	VOCs[2,4]	2	80 mL	40-mL glass vials with Teflon® - lined caps	HCl to pH <2 and cool to 4°C	14 days for analysis
	Metals	1	1 Liter	1 Liter polyethylene bottle.	Nitric acid to pH <2 and cool to 4°C	6 months for analysis
	SVOCs	1	80 oz.	80 oz. glass amber bottles with Teflon® - lined caps	Cool to 4°C	7 days for extraction analysis within 40 days
	Sulfate Chloride	1	1 Liter	1 Liter polyethylene bottle.	Cool to 4°C	28 days
	Ammonia Nitrate	1	1 Liter	1 Liter polyethylene bottle.	Sulfuric acid to pH<2 and Cool to 4°C	48 hours[5]
	TSS	1	1 liter	1 liter polyethylene bottle	Cool 4°C	7 days for analysis

[1]All holding times are calculated from the date of sample collection.
[2]Duplicate analysis requires the sample to be collected at double the volume specified.
[3]28 days for sulfate, ammonia, chloride.
[4]MS/MSD for organics and spike/duplicate for metals and cyanide analyses require the sample to be collected at double the volume specified.
[5]28 days for ammonia
Note: One trip blank will accompany each aqueous VOC shipment container. Trip blanks will consist of two 40 mL vials.

- If a sample is deemed a dangerous good, it will be packaged in accordance with the IATA Dangerous Goods Regulations, based on the classification of the samples.

- Each container will be placed in a separate zip-lock bag and the bag securely closed (eliminating air from within the bag).

- The low concentration samples will be placed in a shipment container lined with a large polyethylene bag. Enough vermiculite or equivalent absorbent material will be packed around the samples to minimize the possibility of container breakage. The temperature will be maintained at 4°C with cold packs or ice, sealed in plastic bags. The remaining space in the shipment container will be filled with additional packing material and the large polyethylene bag will be sealed.

- The completed chain-of-custody form identifying the contents of the sample shipment container will be placed in a large zip-lock bag and taped to the inside lid of the shipment container (the sampler's copy of the form will first be removed).

- The shipment container lid will be closed and sealed shut with strapping tape. If the container has a drain port, it will be also sealed shut with tape. Two chain-of-custody seals will be placed across the seam between the lid and base. The seals will be placed in a staggered configuration (either front left side and back right side or vice versa). This will ensure that if the shipment container is opened by unauthorized persons, the custody seal will break and indicate intrusive action. The custody seals will be covered with waterproof tape to prevent accidental damage during shipment.

- The shipment airbill will be affixed to the top of the shipment container. It will identify the shipper's and recipient's names and addresses. A WESTON mailing label will also be affixed to the top of the shipment container and will contain the same information as the airbill in case the airbill becomes detached from the shipment container during shipment.

- "This Side Up" arrows will be placed on the four sides of the shipment container.

- All samples will be shipped within 24 hours of collection. All samples will be shipped via overnight delivery service.

Sample handling, packaging, and shipment activities are the responsibility of the assigned WESTON Field Sample Manager; however, all field samplers will assist, as necessary. The Field Sample Manager will provide the WESTON Field Team Leader with the retained copies of the chain-of-custody forms and airbills. The Field Team Leader will be responsible for updating the WESTON Project Manager on sample management activities. The Field Team Leader will also be responsible for contacting the Laboratory Project Manager or his/her designee and informing him/her of each shipment of samples. At a minimum, the Field Team Leader will provide the following information:

- Site name.
- Number of samples shipped.
- Number of sample shipment containers shipped.
- Date samples were shipped.
- Date samples should be received.
- Shipment airbill number(s).

5.3 SAMPLE NUMBERING SYSTEM

All samples for analysis, including QC samples, will be given unique sample numbers. A listing of sample numbers, cross-referenced to chain-of-custody and shipment documents, will be maintained in the sample handling logbook.

Two identification numbers, a WESTON project sample number and a WESTON-Gulf Coast Laboratories sample identifier, will be used for each soil and groundwater surface sample.

The project sample number, which highlights the sample matrix and location, will be used for presentation of the data in memoranda and reports. The WESTON-Gulf Coast

Laboratories identifier is assigned by the laboratory custodian at the time of sample receipt and is the primary means of tracking a sample through the laboratory.

5.3.1 Project Sample Numbering System

The project sample numbers will be composed of the following three components:

- Project identifier. A three character designation will be used to identify the facility from which the sample was collected. For this project, it will be TC1. TC stands for Techalloy Company, and the numerical designation (1, 2, 3, etc.) refers to the phase of the project.

- Location and sample type for Geoprobe sampling. This shall consist of the following:

  - A two character code that refers to the SWMU around which the sample was collected. The two character code is combined with a two digit numerical code. The numerical code refers to the specific location around the SWMU. The individual SWMUs have been assigned the following codes.

    - WS = wire slag disposal area.
    - BG = BG-5 oil drums.
    - HP = spent acid holding pond.
    - WW = plating waste water disposal area.
    - CP = concrete evaporation pad.
    - BK = background sample collected upgradient from the site.

    The sample locations will be numbered beginning with the northernmost grid line and numbering from west to east.

  - The second part is a three character code that refers to the sample media and the depth from which it was collected. A soil sample will be denoted by "SB", while "GW" will refer to a groundwater sample. A sample collected from a shallow depth will be denoted by "S", and a deep sample will be denoted by "D". Field QC samples will have additional character codes. "DP" denotes a duplicate sample. "FB" refers to a field blank, and "MS/MSD" denotes matrix spike/matrix spike duplicate sample.

- Location of samples collected from monitoring wells. Samples collected from monitoring wells will be labeled with a two character code (MW), which stands for monitoring well. The letter code will be followed by a two-digit code which denotes the well location. There are two deep wells, MW05D and MW03DD. Samples collected from these wells will be labeled with a "D" or "DD", following the well location numbers. Field QC samples will have additional character codes. "DP" denotes a duplicate sample. "FB" refers to a field blank, and "MS/MSD" denotes a matrix spike/matrix spike duplicate sample.

Pure water trip blanks will be labeled as "TC1-PWTB01". The two digits at the end will increase consecutively depending on the number of trip blanks required.

Samples Collected With Geoprobe

- Sample No. TC1-HP01-SBD-DP would indicate the following:

TC	-	Techalloy Company site
1	-	Collected during Phase I of investigation
HP01	-	Collected near the holding pond, location 01
SBD	-	Deep soil sample
DP	-	Duplicate sample

- Sample No. TC1-CP02-SBS-MS/MSD would indicate the following:

TC	-	Techalloy Company site
1	-	Collected during Phase I of investigation
CP02	-	Collected near the concrete evaporation pad, location 02
SBS	-	Shallow soil sample
MS/MSD	-	Matrix spike/matrix spike duplicate sample

- Sample No. TC2-BK03-GWS would indicate the following:

TC	-	Techalloy Company site
2	-	Collected during Phase 2 of investigation

BK01	-	Collected upgradient from the site, background sample, location 01
GWS	-	Shallow groundwater sample

Samples Collected From Monitoring Wells

- Sample No. TC1-MW03-FB would indicate the following:

TC	-	Techalloy Company site
1	-	Collected during Phase I of investigation
MW03	-	Sample collected from Monitoring Well Number 3
FB	-	Field blank sample

5.3.2 Laboratory Sample Identifier

The laboratory sample identifier for the WESTON-Gulf Coast Laboratories will be an eleven-digit number in the following format: YYMMGBBB-XXX, where YYMMGBBB is the batch number, and:

YYMM	=	Year/month (e.g., 9307);
G	=	Laboratory identifier (e.g., G=WESTON-Gulf Coast Laboratories);
BBB	=	A computer-assigned consecutive batch number that rolls over after 999 to 01; and
XXX	=	A consecutively assigned sample number unique to a specified field sampling point.

Upon arrival at the laboratory, the laboratory batch number will be recorded by the laboratory custodian/sample log-in person on the chain of custody form, as well as on the bottle label, using a permanent marker.

SECTION 6

SAMPLE DOCUMENTATION AND TRACKING

6.1 FIELD RECORDS

Field observations and other information pertinent to the collection of samples will be recorded in the field. All entries will be made in a bound logbook with black or blue ink. Logbooks will be identified by unique sequential numbers. The data to be recorded for each sample will include date, time (military time reference), sample number, sample location, and name of the person(s) collecting the sample. In addition, general information will be recorded daily in the logbook including personnel present at the site, level of protection being worn, and weather. Photographs will be taken and logged to document sampling activities.

6.2 FIELD CHAIN-OF-CUSTODY PROCEDURES

Field chain-of-custody procedures are discussed in Subsection 6.1 of the QAPP.

6.3 SAMPLE DOCUMENTATION FORMS

The main sample documentation form for the Techalloy RFI sampling activity is the WESTON Chain-of-Custody Form (also called the custody transfer record/lab work request form). In addition, as previously mentioned, chain-of-custody seals and sample container labels will be utilized. The important protocols associated with each of these is summarized below:

Chain-of Custody-Form

- Each sample shipment container will be accompanied by a chain-of-custody form(s) documenting contents. The information on the chain-of-custody form will include project sample identification numbers; sample matrix; sample collection date; analysis required; type and number of sample containers per sample; and preservatives (if any).

- The carrier service does not need to sign the form if the chain-of-custody seals remain intact. The airbill number and the chain-of-custody seal numbers should be written on the chain-of-custody form.

- Every sample in the associated sample shipment container will be documented on the chain-of-custody form.

- The facility name and associated project work order number will also be written on the chain-of-custody form.

- The Field Team Leader or his designee will sign and date the chain-of-custody form as a relinquisher of the samples.

Custody Seals

- Two seals per shipment container are used to secure the lid and provide evidence that samples have not been tampered with. All seals will be prenumbered.

- The seals will be covered with clear tape after being affixed to the shipment container, to prevent inadvertent damage.

- Each set of seal numbers will be recorded on the chain-of-custody form.

- Seals will be used on all sample shipment containers.

Sample Bottle Labels

- Each sample container will have a sample label affixed to its outer surface.

- Each sample label will contain the WESTON project sample number, the date of sample collection, the analytical requirements, and the time of sample collection.

- All information on the sample label will be checked with the information on the chain-of-custody form to confirm accuracy and consistency between documents.

Once the Field Sample Manager has turned over the sample paperwork to the Field Team Leader, it is the responsibility of the Field Team Leader to maintain all the paperwork and to be able to account for all forms at the end of field work.

SECTION 7

SAMPLING TEAM ORGANIZATION

The Techalloy site field team organization is presented in Section 3 of the QAPP.

SECTION 8
SAMPLE CONTAINER PROCUREMENT

All sample containers to be used during the Techalloy RI/FS sampling program will be purchased by WESTON-Gulf Coast Laboratories from a reputable supplier capable of providing the bottle quantity and type that meet or exceed the strict quality control requirements set forth by the U.S. EPA in OSWER Directive No. 9240.0-05, "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers", April 1990.

The contaminant-free sample containers (bottles) used for analyzing TCL and TAL analytes for this sampling effort will be prepared according to the procedures specified in U.S. EPA's *Specifications and Guidance for Obtaining Contaminant-Free Sample Containers*, (U.S. EPA, 1990) or the most current revision. It will be ensured that the bottles used for the sampling activity do not contain target organic and inorganic contaminants exceeding the level specified in the above-mentioned document. For non-TCL and non-TAL types of analytes, bottles shall either be cleaned in the same way as for the similar types of analytes or it will be negotiated with the bottle supplier(s) to clean and test the bottles for the analytes of interest not to exceed approximately one-third of the required quantitation limits. Specifications for the bottles will be verified by checking the supplier's certified statement and analytical results for each bottle lot, and will be documented on a continuing basis. The field team leader or his/her designee will record the bottle lot numbers associated with each sample collected during the Techalloy sampling effort. This data will be maintained in the project evidence file and will be available, if requested, for U.S. EPA review.

In addition, the data for field blanks and trip blanks will be monitored for contamination, and corrective actions will be taken as soon as a problem is identified. This will be accomplished either by discontinuing the use of a specific bottle lot, contacting the bottle supplier(s) for retesting the representative bottle from a suspect log, resampling the suspected samples, validating the data (taking into account that the contaminants could be introduced by the laboratory [i.e., common laboratory solvents, sample handling artifacts, etc.] or the contaminants could be a bottle QC problem) so as to make an educated determination if the bottles and the data are still usable, whichever is appropriate.

For the Techalloy project, the corrective actions will be conducted in a comprehensive manner in order to avoid the use of identified contaminated lot(s) from other projects. The The corrective action will also ensure that if the bottle supplier(s) is deemed unresponsive or unable to provide cleaned bottles as specified, then other U.S. EPA-related projects will not be negatively impacted by the use of the noncompliant bottles.

If resampling is deemed necessary, WESTON will require authorization for additional effort. Any schedule delays will be brought to the attention of the U.S. EPA RCRA Project Coordinator.

SECTION 9

MANAGEMENT OF INVESTIGATION - DERIVED WASTES

For purposes of this FSP, investigative-derived wastes (IDWs) are defined as any by-product of the Techalloy RFI activities that is suspected or known to be contaminated with hazardous substances. The performance of the Techalloy RFI field activities will produce waste products such as development and purge groundwater, decontamination wastewater, drill cuttings, and expendable personnel protective equipment. In order to collect the decontamination wastewater, a portable/temporary decontamination pad will be set up on site. Wastewater will be pumped from the decontamination pad, collected and containerized. Wastewater and purge water from the developing and sampling of groundwater monitoring wells will be stored temporarily in DOT-approved drums. This water will then be pumped into a portable on-site storage tank, which will reduce the amount of drums needed. Each type of waste will be segregated during the field activity, containerized or isolated, sampled, and labeled accordingly. Wastes will be stored on site until the analytical results of the investigation are interpreted. At that time, each segregated waste will be evaluated based on the RFI field data and disposal arrangements executed in accordance with appropriate local, state or federal regulations. WESTON will refer to the U.S. EPA's *Management of Investigation-Derived Wastes During Site Inspections*, (U.S. EPA, 1991) for guidance on off-site disposal policy, if this action is deemed necessary.

APPENDIX B

STANDARD OPERATING PROCEDURES (SOPs) FOR HNu, pH, SPECIFIC CONDUCTANCE, AND TEMPERATURE METERS

STANDARD OPERATING PROCEDURE

WATER LEVEL MEASUREMENT

1.0 PURPOSE

This procedure describes the method for determining the depth-to-water in a monitoring well or piezometer.

2.0 DISCUSSION

Generally, water level measurements from piezometers or monitoring wells are used to construct potentiometric surface maps. Therefore, all water level measurements at a given site should be collected within a 24-hour period. Under the following conditions, all measurements must be taken within a shorter interval.

- A range of observed changes between wells that is too large to be indicative of natural gradient groundwater.
- Drastic atmospheric pressure changes.
- Tidally influenced aquifers.
- Aquifers affected by river stage, impoundments, or unlined ditches.
- Aquifers stressed by intermittent pumping of production wells.
- Aquifers being actively recharged because of a precipitation event or induced infiltration.

The device used to measure water levels should be adequate to attain an accuracy of 0.01 feet. Generally acceptable devices are listed below.

- Chalked steel tape.
- Fiberglass tape with a popper.
- An electric sounder.

There should be a survey mark on the piezometer or well casing as a reference measuring point. If there is not a survey mark, place one on the casing. The mark should be permanent.

Allow water levels in piezometers and monitoring wells to stabilize for a minimum of 24 hours after well construction and development before measurements are taken. Recovery may take longer in wells completed in tight formations.

3.0 PROCEDURES

A. Obtain a logbook from the site manager or other project-designed individual.

B. Locate monitoring wells or piezometers to be measured and the appropriate decontamination area.

C. Decontaminate all sampling equipment before taking the first measurement and between measurement intervals.

D. When taking a number of water level measurements, it is preferable to start at those wells that are the least contaminated and proceed to those wells that are the most contaminated.

E. Whenever a water level is to be measured, enter a description of the measuring location into the logbook.

F. Remove locking well cap. Note the location, time of day, weather conditions, and date in the logbook.

G. If required by site-specific conditions, monitor the headspace of the well with a photoionization detector or a flame ionization detector to determine the presence of volatile organic compounds and record the measurements in the logbook.

H. Lower the measuring device into the well until the water surface is encountered.

I. Measure the total depth of the well and the distance (in feet, tenths of feet, or hundredths of feet) from the water surface to the reference measuring point on the well casing. Record the well depth and distance to water in the logbook.

J. If the total depth of the well has increased, and/or if the well appears to have heaved, a re-survey of the vertical elevation must be performed. If the total well depth has decreased, the well screen may havE silted in, and redeveloping may be needed. Notify the Site Manager if either of these situations has occurred.

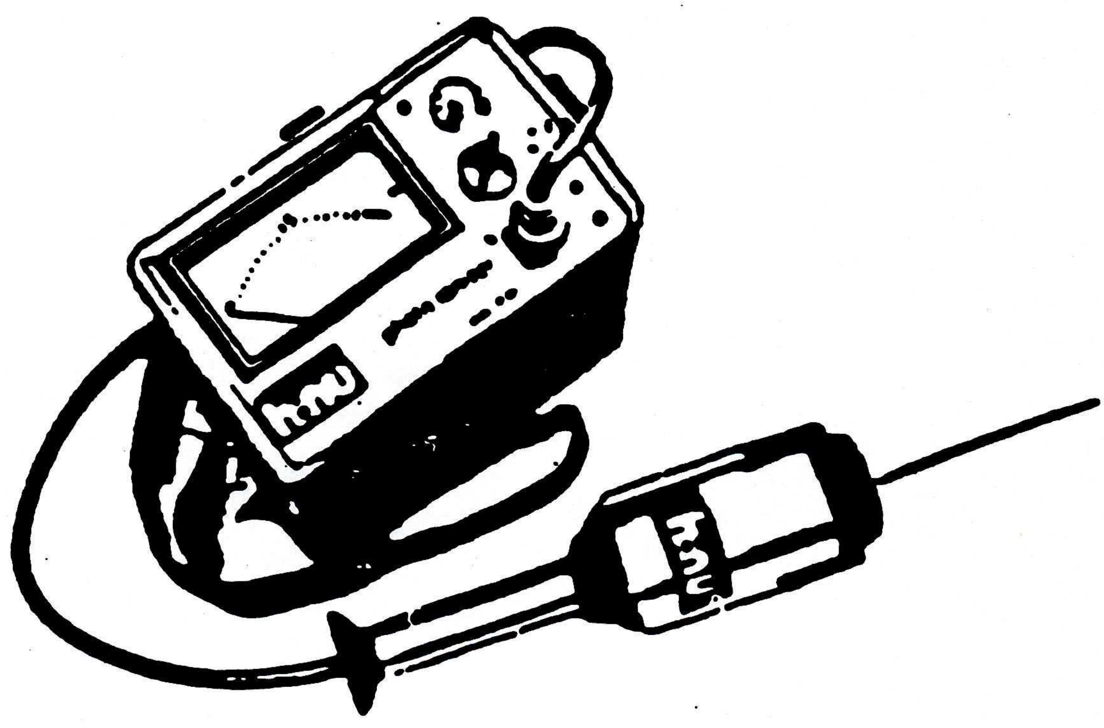
K. Measure depth-to-water at least twice or until results are reproduced and record the measurement in the logbook.

L. Remove all downhole equipment. Replace the well casing cap and locking steel caps.

M. Decontaminate all downhole equipment and store for transport to the next measuring location.

N. Note any physical changes (like erosion or cracks) in the protective concrete pad or variation in the total depth of the well in the logbook. Check the operational condition of the padlock.

FIELD MANUAL FOR THE OPERATION, CALIBRATION AND TROUBLESHOOTING OF THE HNU PHOTOIONIZER



WESTON

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The HNU is a portable trace gas analyzer that can be used to measure a wide variety of organic vapors including chlorinated hydrocarbons, heterocyclics and aromatics, aldehydes and ketones, as well as several inorganic gases including hydrogen sulfide and ammonia.

The HNU photoionizer employs the principal of photoionization for detection. Photoionization is initiated by the absorption of a photon of ultraviolet radiation energetic enough to ionize a molecule and produce an instrument response only if the ionization potential (IP) is equal to or slightly less than the ionizing energy supplied by the instrument's UV lamp (9.5 eV, 10.2 eV, 11.7 eV). Species that have a very high IP will display a poor instrument response or none at all. Employing the 11.7 eV lamp will ensure the total range of detectable species, but there will still be a number of undetectable sample components, such as cyanide or methane. So, whenever possible, it is recommended that the 11.7 eV probe be used in cases involving unknown species.

The 11.7 eV lamp is identified by the inscription "11.7 ev" near the lamp number on the glass envelope. A comparison of response to selected species of compounds utilizing the 9.5 eV, 10.2 eV and 11.7 eV lamps are listed in Table 1. The relative sensitivity of the 11.7 eV lamp is about one-tenth that of the 10.2 eV. The 11.7 eV lamp provides a more universal response than the 10.2 lamp which makes the 11.7 eV lamp more practical to our type of needs at Weston.

<u>CAUTION</u>: The HNU instrument is not intrinsically safe. Its use in a probable explosive environment should be attempted after the area in question has been metered by a explosimeter and deemed safe for the HNU instrument operation.